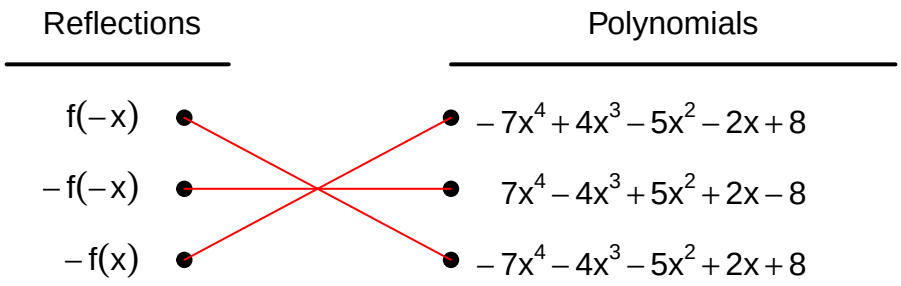
Name: Date:

Exam: Function Reflections (Solution version 36)

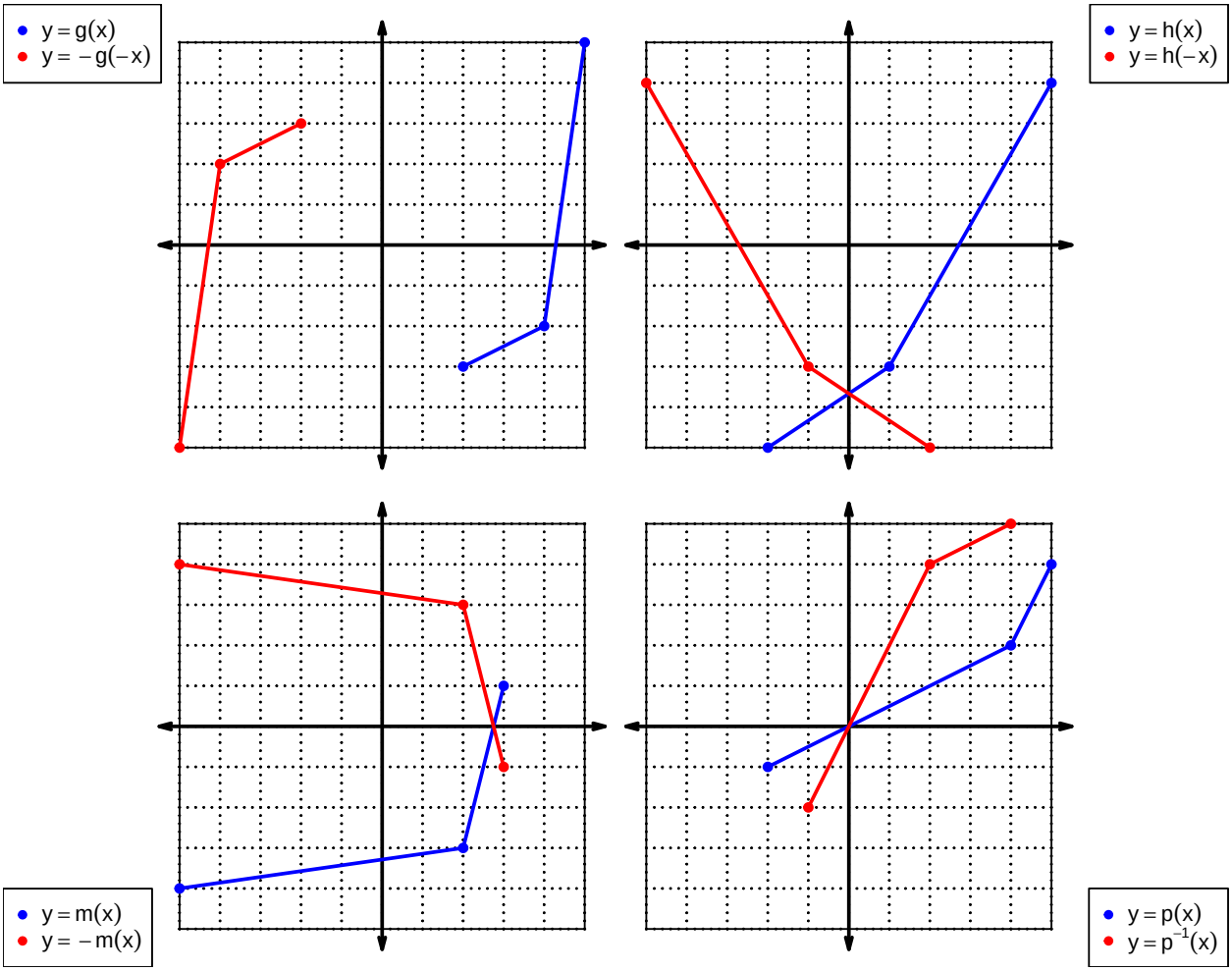
1. Let function f be defined by the polynomial below:

$$f(x) = 7x^4 + 4x^3 + 5x^2 - 2x - 8$$

Draw lines that match each function reflection with its polynomial:



2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	2	5	7
2	5	4	9
3	4	1	2
4	1	8	3
5	9	3	8
6	6	9	1
7	3	2	5
8	7	6	6
9	8	7	4

3. Evaluate $h(7)$.

$$h(7) = 5$$

4. Evaluate $g^{-1}(1)$.

$$g^{-1}(1) = 3$$

5. By filling more rows of the table, it is possible to make function f **even**. If that were done, what would be the value of $f(-4)$?

If function f is even, then

$$f(-4) = 1$$

6. By filling more rows of the table, it is possible to make function h **odd**. If that were done, what would be the value of $h(-8)$?

If function h is odd, then

$$h(-8) = -6$$

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7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
   Let polynomial p be defined with the following equation:

$$p(x) \;=\; x^2 + 1$$

   a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) \;=\; (-x)^2 + 1$$
$$p(-x) \;=\; x^2 + 1$$

   b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) \;=\; -\left(x^2 + 1\right)$$
$$-p(-x) \;=\; -x^2 - 1$$

   c. Is polynomial p even, odd, or neither?

   even

   d. Explain how you know the answer to part c.

   We see that $p(x) = p(-x)$ for all x because $p(x)$ and $p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an even function.

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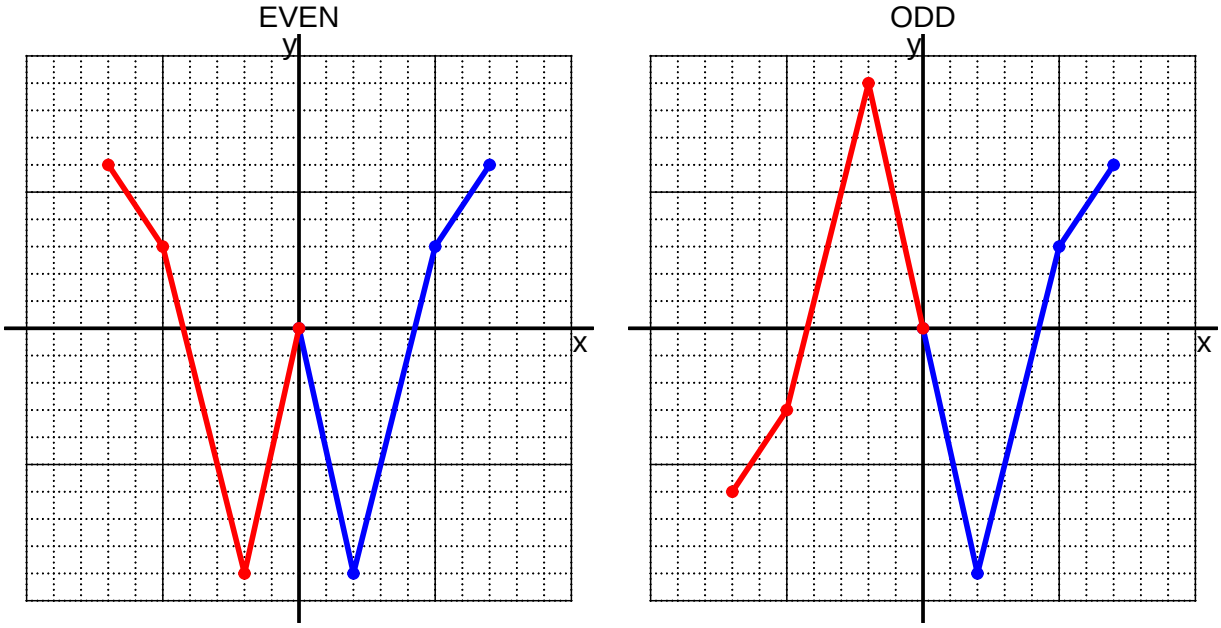
8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function f be defined with the equation below.

$$f(x) = 8x - 7$$

a. Evaluate $f(9)$.

step 1: multiply by 8
step 2: subtract 7

$$f(9) = 8(9) - 7$$
$$f(9) = 65$$

b. Evaluate $f^{-1}(17)$.

step 1: add 7
step 2: divide by 8

$$f^{-1}(x) = \frac{x+7}{8}$$
$$f^{-1}(17) = \frac{(17)+7}{8}$$
$$f^{-1}(17) = 3$$

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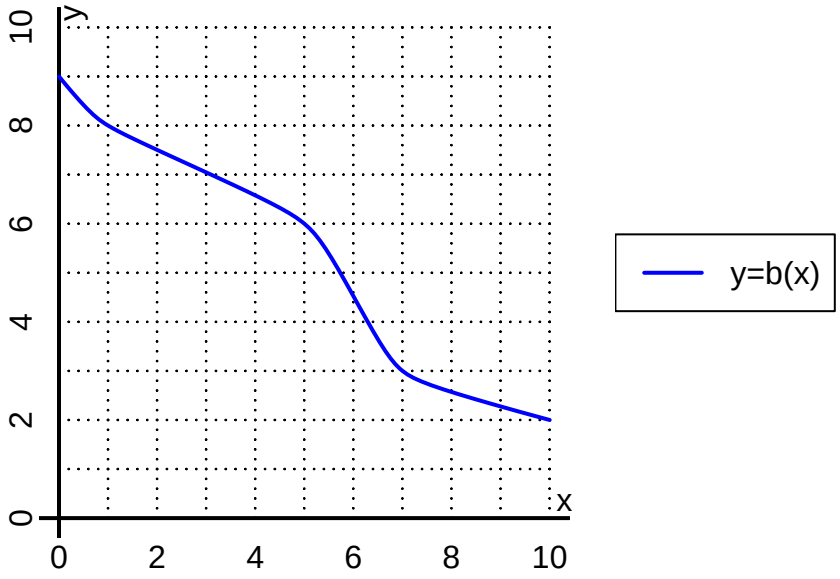
10. The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(5)$.

$b(5) = 6$

b. Evaluate $b^{-1}(8)$.

$b^{-1}(8) = 1$

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11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	6	-6	-6	6
-1	-7	7	7	-7
0	0	0	0	0
1	7	-7	-7	7
2	-6	6	6	-6

b. Is function f even, odd, or neither?

odd

c. How do you know the answer to part b?

Function f is odd because column $-f(-x)$ matches column $f(x)$ exactly.